

The Dangers of Using of Supplemental Feeding to Increase the Carrying Capacity of Land for White-tailed Deer

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By: Dr. Robert D. Brown
Professor and Head
Department of Wildlife and Fisheries Sciences
Texas A&M University

The Question

The question today is not really whether it is wise to use food plots or supplemental feed to enhance the nutrition of free-ranging deer. The question is whether Texas Parks and Wildlife Department (TPWD), our state regulatory agency, should include supplemental feed and food plots when determining the CC of land for deer, and to use that to determine the number of harvest permits issued to the landowner. Right now, TPWD only uses the "natural" CC of land to determine the level of harvest. Some small but vocal organizations, such as the Texas Deer Association, wish to have those rules changed. Their position, as stated in "Tracks", the TDA newsletter, is, "First, we want the flexibility for landowners to manage their deer herds under the level of management intensity they desire" (J. Kroll, TDA, 2000b, pg. 3).

Whose deer?

But before we get into the scientific and ethical questions, let's not forget that the animals on a landowner's property are not "their" deer. A basic concept of the culture of our nation is that all wildlife belongs to me - and to you - all of the people, not just the landowner. Our country was first settled largely by Europeans who came here to escape feudal systems, wherein, among other things, the Kings and land barons owned the wildlife. Our Constitution established a Public Trust Doctrine, born of English Common Law, wherein natural resources, which were "too important to be owned" belonged to all of us, including navigable waters, scenic and historic sites, and wildlife (Williamson, 2000).

Supplemental Feeding Can Harm the Habitat

As to the issue of supplemental feeding to increase deer CC, the TDA newsletter stated, "There is no scientifically credible evidence to support the claim that intensive management harms native ecosystems. In fact, evidence supports the contrary" (J. Kroll, TDA, 2000a, pg. 3). What I would like to present now is a set of data, facts, assumptions and concerns of a variety of wildlife biologists about how supplemental feeding can harm the ecosystem, and how increasing the carrying capacity beyond its natural limits can harm the deer population itself.

First, I shouldn't have to repeat the definition of habitat. Deer habitat consists of food, water, shelter and space. If you think food is the only important component of habitat, look at the literature on fawn survival during severe droughts in Texas. Thus, when we speak of food plots and supplemental feeding, we speak only of "nutritional CC," not "total or real CC."

One of the arguments by those in support of supplemental feeding is that it not only enhances the nutrition, and thus the health and physiology of the deer, but that it could take pressure off of the natural vegetation by decreasing grazing and browsing pressure. Presumably, this could lead to a greater biomass of vegetation, more diversity of plants, and thus a better range or forest vegetative condition. Unfortunately, there is little data to support this, and substantial data to refute it.

Foraging Theory

Optimal foraging theory suggests that a deer's decision to consume a particular food item is based on its value to the animal, or its nutrient content, and the energy and other nutrient costs associated with searching and handling it relative to other food items (Stephens and Krebs, 1996). Thus, by this theory, deer should seek out the most nutritious plants first. As these plants become scarce, it then becomes profitable for the deer to include less nutritious items in its diet. Remember that deer are concentrate selectors, requiring highly soluble carbohydrates to survive. Unlike cattle, sheep and goats, deer need forbs and woody plant foliage as their diet, and are poorly adapted to utilizing more fibrous material.

Sonora Study

In 1990, Blake Murden and Dr. Ken Risenhoover of our department setup a series of studies with deer and goats at the Sonora, Texas Experiment Station. Deer were provided pelleted supplements or not, and placed in one-acre enclosures to observe their foraging behavior. The researchers predicted that the supplemented deer would become more selective in their foraging, rather than less selective, since the deer's' immediate nutritional needs had been met by the supplement. That is exactly what they found. They found that the deer's' movement rates or foraging times increased, and that the deer ate the less common, more nutritious, or "ice cream plants" at a higher rate than when not supplemented. The total number of plant species consumed was not different when the deer were supplemented or not. Between their consumption of pellets and their foraging, their overall diet improved, which is what you want from supplementing. Thus the supplement allowed the deer more time to be selective in grazing, so they had time to select the plants that were higher in protein and energy than did the deer that were not supplemented.

Murden and Risenhoover's conclusions were that supplementing deer could cause the animals to stay in an area where forage resources were depleted, whereas they would normally disperse to seek better forage. Supplementation can thus lead to overutilization of high quality plants and underutilization of low quality plants, which if continued over time would lead to simplification of the vegetative community, loss of palatable plant species, and degradation of the range.

Kingsville Study

To be fair, this is just one study. Mike Gutierrez and Dr. Tim Fulbright at TAMU-Kingsville attempted to take Murden and Risenhoover's penned deer study to the field. They harvested deer which did or did not have access to winter wheat food plots in South Texas. Like Murden and Risenhoover's tame deer consuming food pellets, the wild deer which were grazing food plots continued to browse and graze on native vegetation. But, the deer they examined, which had consumed the wheat in the food plots, did not increase their selectivity of native plants.

These authors cautioned, however, that the deer offered food plots may have become more selective at the plant parts scale (which was not measured in this study) and not the plant species scale (which was measured). In addition, they pointed out that in Murden and Risenhoover's study, the pellet fed was higher in quality (16% CP and 16 Kj/g DE) than most of the surrounding native plants, whereas in their study, the winter wheat was of modest quality (16% CP; 3.5 Mkal/kg DE) as compared to the excellent condition of the surrounding native range plants. This could have impacted the selectivity of the deer.

I must also point out that there are plenty of detractors to the optimal foraging theory. What goes into an animal's decision as to what to eat, when to eat, and how far to travel could be made of a number of highly complex decisions, some so simple as what smells or tastes good, and some as complex as the deer's recent experiences with local predators. So this debate as to the effects of supplemental feeding on the quality of rangeland will continue. But the basic premise of degradation of vegetation around supplemental feeding sites is supported by studies in other habitats.

Forest Habitats

In 1993 and 1994, Dr. Paul Doenier and his colleagues examined the impact of winter supplementation on browse consumption by white-tailed deer in Minnesota. They found that the deer ate little of the supplement when the weather, and thus the nutritional stress, was mild. But when the deer did consume the supplement, they continued to consume browse. They found that in supplemented and non-supplemented areas, browse consumption varied with month and with the severity of the weather and snow depth, as one might expect. They found that the browse pressure in control areas was constant over a 900-meter transect. But the supplemented deer increased their browsing the further they were from the feeder, especially over 300 m from the feeder, and in all months, browse pressure was greater by the supplemented deer than that by the non-supplemented deer. This overall concept is supported by studies in Maine, where over browsing associated with concentrated deer herds occurred in a one-mile radius of feeding stations (Williamson, 2000).

Impact of Feeders/Food Plots on Deer Dispersal

This tendency for feeders or food plots to reduce the dispersal of deer and concentrate them in an area is a major concern. Venderhoof and Jacobson, studying free ranging deer in Mississippi forests, found that deer did not change their home ranges due to the presence of food plots. They did find, however, that the deer tended to stay in the area of their home range nearest the food plot. Drs. Tim Ginnett and Susan Cooper, studying deer behavior recently at the Uvalde, Texas Experiment Station, found that does with no feeder in their home range had 95% kernel home range

estimates of 1,867 acres vs 1,917 acres for does with a feeder. Thus there was no statistical difference. But, using the 50% kernel estimate as an indicator of core area size, deer with feeders had a core area of only half the size (133 acres) of those with no feeder (247 acres). Interestingly, the core areas did not always include the feeder itself. Ginnett and Dr. Keith Owens at Uvalde also put out seedlings in plots around feeders and at control sites. Their data are not completely analyzed, but it seems the deer browsed seven times more heavily near the feeders than at control sites. Like the others, Ginnett and Cooper concluded that supplemented deer still browse, use portions of their home range more intensively, and could cause habitat deterioration near the feeders.

Thus far, I have only covered the potential impact of supplemented deer on the condition of range and forest vegetation, without consideration of actually increasing the number of deer. Keith McCaffery, a nationally known deer biologist in Wisconsin, perhaps said it best, "One does not protect a garden from deer by placing a large feed pile in the center of it."

Impact of Supplemental Feeding/Food Plots on the Deer

Regardless of the impact to range and forest, where measured in these studies, the deer themselves benefited from the extra groceries of the food pellets or food plots. But these nutritional gains may be purchased at a heavy price, not just to the condition of range and forest, or to the landowner's pocketbook, but to the health and survival of the deer as well. Remember that food is only one leg of a 4-legged habitat table.

Perhaps the best cumulation of arguments against supplemental feeding was most recently produced by the Wildlife Management Institute (Williamson, 2000). In this easily readable and well-referenced brochure, Scott Williamson, formerly a biologist in Texas, states, "When and where such feeding is done, it is undertaken only, if not expressly- for the interest of people, because fed animals almost invariably will not benefit and will very likely be harmed by the practice."

Disease Transmission

One of the major points of this paper is the concern over transmission of disease. It amazes me that we have not done more studies in Texas on disease transmission at food plots and deer feeders, whether they be for supplementing the deer or for baiting. We know that in 1994 tuberculosis (Tb) was first detected in wild deer in Michigan. It is now in a 5-county area, and has spread to carnivores and dairy herds. As a result, deer feeding, including baiting, has been restricted.

In Wyoming and around Yellowstone Park, brucellosis is wide spread among cattle, elk, and bison, the later two species being concentrated on feeding grounds in the winter. Likewise Chronic Wasting Disease (CWD) has now been observed in free-ranging elk and mule deer in several western states. Since CWD is passed animal to animal, concentrations caused by supplemental feeding is believed to increase the spread of the disease.

Behavioral Concerns

In addition, concentrating deer eliminates the habitat component of "space." Deer that are crowded, for whatever reason, increase their social interactions. Ozoga in Michigan (1972) found that crowding can lead to increased aggression and fighting among bucks as well as does, which among bucks leads to broken antler tines, injuries and deaths. In addition, some deer may "hog" or protect the feeder, denying access to other deer.

All of these concerns have to do with the impact of food plots and feeders on the habitat and on the deer, without considering what would happen if the population of deer increased.

Feeding Increases the Deer Population

Naturally, there is abundant literature as to the effect on the deer habitat, the deer population, and the populations of predators and other critters, and their habitat, when deer populations explode. Numerous studies have shown that supplemented deer were in poorer condition than other deer, as the impact of over population of deer changed the vegetation for the deer and for other animals and birds. Remember that deer can twin, and fawns can breed. When diet quality and quantity increase, reproduction and survival are enhanced, leading to over population, which again leads to over browsing of the native vegetation. McCullough in 1997 found that mule deer and elk in the West and Schmitz found in 1990 that white-tailed deer in the east stripped habitats of all available food when populations exploded due to supplemental feeding. "Supplemental feeding does not prevent malnourishment - it usually just increases the population size at which malnourishment occurs" (Pekins and Tarr, 1997).

Impact on Ground Nesting Birds and Other Non-Target Species

Anyone who has planted food plots or put out feeders for deer knows that deer are not the only beneficiaries of these additional groceries. Supplemental feed is consumed by numerous non-target species, including raccoons, porcupines, opossums, skunks, ringtails, squirrels, rabbits, javalinas, feral hogs, livestock, quail, wild turkey, and birds. Thus, there is a possibility of concentrating these species as well as the deer, and of concentrating their predators. From 1997-99, Susan Cooper and Tim Ginnett at the Uvalde Experiment Station studied the impact of deer feeders on the survival of ground nests. Using chicken eggs to simulate turkey nests, they found that the presence of supplemental feeders significantly decreased the survivorship of the nests within 400 m of the feeder, when there was adequate ground cover. When ground cover was sparse, nest survivorship was poor everywhere.

Cooper and Ginnett agreed with Clark and his colleagues, who, in 1996 warned that increased nutrition of predators through supplemental feeding could lead to increased productivity, survival and, ultimately, increased populations of predators in the habitat. At the same time they also agreed with Goodrich and Buskirk who in 1995 warned against excessive removal of predators due to the unforeseen consequences to the ecosystem. Cooper and Ginnett recommend that deer feeders, if used, should be placed away from prime nesting habitat for wild turkeys.

Finally, remember that non-target species are usually monogastric animals, and are more susceptible to nutritional diseases than deer. Neal Wilkins found that 40% of a sampling of 100

bags of deer corn sold in Texas last year had levels of aflatoxin that were illegal, and 20% had levels that would be toxic to birds and other non-target species, as well as deer if consumed over a long period of time. Black head in turkeys is transmitted by consuming contaminated feed, water or soil.

Now I hope that I have convinced you that supplementing deer is potentially ecologically dangerous - for the deer, for the range or forest, and for the rest of the animals and birds that use that habitat. As Engler said, "Ecological systems are not only more complex than we think, they are more complex than we can think."

Ethical Issues

Before I wrap up, we need to look at the influence of intensive management on the future of hunting. As many of you know, we at Texas A&M have been involved in an effort to address this very issue in our state. Hunting is very important to our state, as a means of managing deer populations, and as a form of recreation. TPWD funds much if not all of its wildlife management from hunting license sales and the matching federal funds. Hunting is also a big business for our state and for our landowners. But whereas our population is growing, the hunting population is stable or declining slightly. And not only are hunting license sales falling, but participation by hunters is declining, hunters are aging, and the public is less accepting of certain aspects of our sport.

In our recent Future of Hunting in Texas brochure, Clark Adams reported his earlier studies that showed why Texas hunt - mostly for meat, for being with friends, and family, and for being with nature. In fact, less than 7% of hunters nationwide are "trophy hunters," but maybe 19% in Texas hunt trophies. He also reported what the Texas general public thinks of hunting - fortunately then generally approve of it - except hunting for trophies and hunting for profit. This has been substantiated by numerous other national studies. But the question of intensive management, and with it supplemental feeding and food plots, requires that we remind ourselves of why we hunt at all.

In 1942 the Portuguese philosopher, Jose Ortega y Gasset published his book, *Meditations on Hunting*. It is a wonderful read, and right on the mark, because his many philosophical thoughts have been substantiated with surveys of hunters and the non-hunting public. Ortega y Gasset is probably best remembered for his statement in the book, "One does not hunt to kill; One kills to have been hunting." While you are chewing that one over, ponder this:

Paleolithic man had to hunt to live. He used cliffs, nets, and traps. Then shepherding and farming came along, but he kept his hunting instincts, using weapons, such as spears and bows and arrows. Later, man didn't have to hunt at all, but we kept at it. Why? According to Ortega y Gasset, it was to reassure us of who we are. The essence of hunting is to pit our senses, abilities, knowledge and experience against that of a wild animal. As he put it, "Hunting is a contest or confrontation between two sets of instincts." In our air conditioned, cell phone, microwave world, success in hunting reassures us that we are still men (and women), and that we can still function in our natural state. But to get that satisfaction, the prey must still be wild, and it must have the advantage, or there will be no satisfaction. As our weaponry has improved, from flintlocks to bolt action rifles to

telescopic sights, we have added restrictions on ourselves – such as bag limits, hunting times, seasons, use of dogs and bait, use of airplanes, and so on. According to the philosopher, our reasons for this is that we don't want to increase the inequality between the hunter and the hunted, for that will lower our satisfaction of the hunt (remember Adam's surveys).

But look what we are doing in Texas. We are on a continuum from being the "Hunter" to what I call the "Shooter." I'm using Fred Gilbert's nomenclature from a recent issue of the Wildlife Society Bulletin, where he defined the "Shooter," as the "Meat Harvester," "Slob Hunter," "Poacher" and "Hunting Jock." Along a continuous evolution we give the hunter advantages over his prey: first the weaponry, then camouflage, then telescopic sights, then tree stands and blinds, then grunts and calls, then laser sights and listening devices, then doe urine and other attractants, then corn and "deer suckers" as bait, then containment with fences, and finally, but at least not in Texas, the use of dogs. I'm not opposing any of these, because, as I said when I started, that I've used most of them myself. But at what point do I (or you) have so much advantage over the deer that we are no longer really hunting, but only shooting, since the deer really has no chance to use its natural instincts?

On the other side of it, we have an evolving continuum from wild animals to domestic animals (such as cattle or farmed deer.) In the domestication process, we first clear the brush and trees to clear pastures, then we provide waterers or tanks, then we count and mark our animals (or take photos of our deer), then we erect fences to contain them, then we control predators so we will be the only consumers, then we start a herd health program such as dipping or vaccination, then comes supplemental feeding, then we buy superior bulls (or Michigan deer) for breeding purposes, then maybe we even try artificial insemination, and finally, or maybe from the first, we insist on private ownership, since we are not about to spend this much money on a public resource.

You can see that at some point, and I don't know where that is, we stop being hunters and the deer stops being wildlife. I ask you, where are we now and where are we going with all of this? How far can we go and retain our self respect and our honor as hunters?

Thus far I've avoided any quotes from Aldo Leopold on this subject, but following is appropriate here: "The recreational value of a game animal is inverse to the artificiality of its origin and the intensiveness of the management system that produced it. A proper game policy is a happy medium between the intensity of management necessary to maintain a supply of game animals and that which would deteriorate its quality or recreational value."

Or, as David Langford, Director of the Texas Wildlife Association has stated, "Once animals are dependant on their de facto owners for their nourishment, the principles of wildlife management have been replaced by those of animal husbandry." And, "The more like animal husbandry that wildlife management becomes, the less defensible hunting becomes."

I argue that if we continue in our current direction, we will not have the choice of how we hunt deer or possibly even whether we hunt deer. The non-hunting public will make those decisions for us.

References

Clark, R.G., K.I. Guyn, R.C.N. Penner and B. Semel. 1996. Altering predator foraging behavior to reduce predation of ground nesting birds. *Trans. N. AM. Wildl. and Nat. Res. Conf.* 61:118-126.

Cooper, S.M. and T. F. Ginnett. 2000. Potential effects of supplemental feeding of deer on nest predation. *J. Wildl. Mgmt.* (In press).

Donier, P.B., G.D. DelGiudice and M.R. Riggs. 1997. Effects of winter supplemental feeding on browse consumption by white-tailed deer. *Wildl. Soc. Bull.* 25(2): 235-243.

Gilbert, F.F. 2000. Considerations in managing wildlife populations for sport. *Wildl. Soc. Bull.* 2(2):457-463.

Goodrich, J.M. and S.W. Buskirk. 1995. Control of Abundant native vertebrates for conservation of endangered species. *Cons. Biol.* 9:1357-1364.

Gutierrez, M.A. 1999. Effects of cool-season food plots on white-tailed deer diet selectivity in south Texas. Master's thesis. Texas A&M university, Kingsville. 29pp.

McCullough, D.R. 1997. Irruptive behavior in ungulates. Pages 69-98 In: W.J. McShea, H.B. Underwood, and J.H. Rappole (eds). 1997. *The science of overabundance: deer ecology and population management.* Smithsonian Institute Press, Washington, D.C. 402pp.

Murden, S.B. 1993. Assessing competitive interactions among white-tailed deer and angora goats. M.S. thesis. Texas A&M University, College Station. 75pp.

Murden, S. B. and K.L. Risenhoover. 1993. Effects of habitat enrichment on patterns of diet selection. *Ecol. Applns.* 3(3):497-505.

Murden, S.B. and K.L. Risenhoover. 1996 Forage use by white-tailed deer: influence of supplemental feeding. Pgs 131-141 IN: C.W. Ramsey (ed.), *Supplemental feeding for deer: beyond dogma.* Proc. of a Symp. in Kerrville, TX. TX Ag. Extn. Serv., College Station. 153 pp.

Murden, S. B. and C.A. Taylor. 1999. Ecological impacts of supplementing free ranging white-tailed deer. In: G. M. Dryden (ed.). *Nutritional ecology of herbivores: feeding and management of cervids in the 21st century.* Fifth. Intl. Symp. on the Nutrition of Herbivores. CD ROM.

Ortega y Gasset, J. 1942. *Meditations on hunting.* Translated into English by H.B. Wescott. 1999. Wilderness Adventure Press. Bozeman, MT. 140pp. Ozoga, J.J. 1972. Aggressive behavior of white-tailed deer at winter cuttings. *J. Wildl. Manage.* 36(3):861-868.

Pekins, P.J. and M.D. Tarr. 1997. The impact of winter feeding on the population dynamics of white-tailed deer in northern New Hampshire. Fed. Aid in Wildl. Rest. Study W-12-R, Proj. 3, Job 2. NH Fish and Game Dept., Concord. 58 pp.

Samuel, D.E. 2000. *Know hunting: truths, lies & myths.* Know Hunting Pubs., Grawn, MI. 298pp.

Schmitz, O.J. 1990. Management implications of foraging theory: Evaluating deer supplemental feeding. *J. Wildl. Manage.* 54:522-532.

Stephens. D.W. and J.R. Krebs. 1986. *Foraging theory*. Princeton University Press, Princeton, N.J.

Texas Deer Assn. 2000a. *Tracks*. March/April. Vol. 1, Issue 1. 11pp.

Texas Deer Assn. 2000b. *Tracks*. May/June. Vol. 1, Issue 2. 15pp.

Williamson, S.J. 2000. Feeding wildlife-just say no! *Wildl. Manage. Inst.*, Washington, D.C., 43pp.

Dr. Robert D. Brown, Head
Dept. of Wildlife & Fisheries Sciences
Texas A&M University
2258 TAMU
College Station, TX 77843-2258, USA
PH: 979-845-1261
FAX: 979-845-3786